



# OptEnet™ 10/100 or 1000 Mb/s Ethernet Media Converter Module with SFPs User Manual

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## INTRODUCTION

This manual describes the OptEnet 10/100 or 1000 Mb/s Media Converter Module with SFPs, and provides procedures for unpacking, installing, and operating this product.

## Revision History

ISSUE	DATE	REASON FOR CHANGE
1	05/2005	Original Publication

## List of Changes

PAGE	IDENTIFIER	DESCRIPTION OF CHANGE
—		New

## Trademark Information

ADC is a registered trademark of ADC Telecommunications, Inc.; OptEnet is a trademark of ADC Telecommunications, Inc.

## Related Publications

Listed below are related manuals and their publication numbers. Copies of these publications can be ordered by contacting the ADC Technical Assistance Center at 1-800-366-3891 (in U.S.A. or Canada) or 952-917-3000, extension 73475 (outside U.S.A. and Canada).

Title/Description	ADCP Number
<b>OptEnet 4000/12000 Media Converter Chassis Installation Instructions</b>	<b>92-045</b>
<b>OptEnet 14000 Media Converter Module Chassis Installation Instructions</b>	<b>92-058</b>
<b>OptEnet CWDM Platform Installation Manual</b>	<b>92-059</b>
<b>OptEnet Media Converter Communications User Manual</b>	<b>92-051</b>
<b>OpteNet SFP Transceiver Specifications</b>	<b>92-064</b>

## Admonishments

Important safety admonishments are used throughout this manual to warn of possible hazards to persons or equipment. An admonishment identifies a possible hazard and then explains what may happen if the hazard is not avoided. The admonishments — in the form of Dangers, Warnings, and Cautions — must be followed at all times. These warnings are flagged by use of the triangular alert icon (seen below), and are listed in descending order of severity of injury or damage and likelihood of occurrence.



**Danger:** *Danger is used to indicate the presence of a hazard that **will** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*



**Warning:** *Warning is used to indicate the presence of a hazard that **can** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*



**Caution:** *Caution is used to indicate the presence of a hazard that **will** or **can** cause minor personal injury or property damage if the hazard is not avoided.*

## General Safety Precautions



**Danger:** *Infrared radiation is invisible and can seriously damage the retina of the eye. Do not look into the optical connector of an operational transmitter, or into the end of an active fiber. A clean, protective cap or hood **MUST** be immediately placed over any radiating connector or optical fiber to avoid exposure to potentially dangerous amounts of radiation. This practice also helps prevent contamination of connectors and adapters. Do not assume laser power is turned off or the fiber is disconnected at the other end.*



**Danger:** *To avoid the possibility of severe and potentially fatal electric shock, never install electrical equipment in a wet location or during a lightning storm.*



**Caution:** *Electronic modules can be damaged by electrostatic discharge (ESD). Before handling modules, wear an anti-static-discharge wrist strap to prevent damage to electronic components. Place modules in anti-static packing material when transporting or storing them. When working on modules, always place them on an approved, electrically grounded, anti-static mat.*

## FCC Compliance Statement

The OptEnet Media Converter modules and chassis have been certified to comply with the requirements for Class A computing devices per part 15 of the FCC regulations.



**Warning:** *This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with limits for a Class A digital device pursuant to Subpart B of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference to TV and radio reception in which case the user, at their own expense, will be required to take whatever measures may be required to correct the interference.*

*This equipment does not exceed Class A limits for radio emission for digital apparatus, set out in the radio interference regulation of the authorization methods of Industry Canada. Operation in a residential area may cause unacceptable interference to TV and radio reception requiring the owner or operator to take whatever steps are necessary to correct the interference.*

***This product conforms to all applicable standards of 21 CFR 1040.***

## UL/CSA Certification

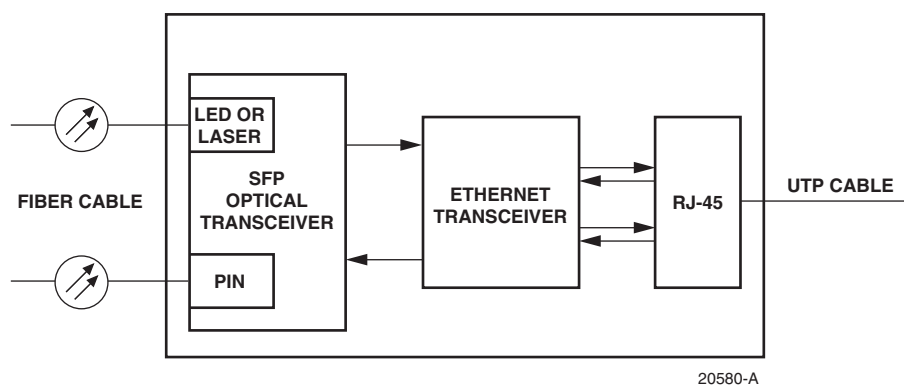
The OptEnet Media Converter modules and chassis have been tested and found to comply with the requirements of UL/CSA 60950.

## NEBS Certification

The OptEnet Media Converter modules and chassis complies with the requirements of GR-63-CORE, Issue 1, October 1995 and GR-1089-CORE, Issue 2, December 1997 with Revision 1, February 1999 as specified in SR-3580, Issue 1, 1995.

## 1 PRODUCT DESCRIPTION

The OptEnet 10/100 or 1000 Mb/s Media Converter with Small Form-factor Pluggable (SFP) module is one of a family of modules that can be plugged into a OptEnet Media Converter chassis. The module is designed to accept SFP transceivers with optical connectors. This provides a number of optical signal choices. The module converts optical signals to electrical signals. The module also performs the reverse function, converting electrical signals to optical signals. A block diagram of the basic converter assembly is shown in [Figure 1](#). Each module has three connections fiber input, fiber output, and RJ45 Ethernet.



**Figure 1. Basic Media Converter Block Diagram**

The OptEnet 10/100 Mb/s Media Converter module supports 10BaseT and 100BaseTX. The 1000 Mb/s Media Converter module supports 1000BaseT data rates with UTP cable. [Table 1](#) lists the cable specifications. Refer to the *OptEnet SFP Transceiver Specifications* listed in [Related Publications](#), for optical specifications.

**Table 1. Cable Specifications**

NETWORK	DATA RATE	MEDIA	LENGTH
10BaseT	10 Mb/s	UTP Cat 3, 4, or 5 (2-pair)	328 feet (100 m)
100BaseTX	100 Mb/s	UTP Cat 5 (2-pair)	328 feet (100 m)
1000BaseT	Gigabit	UTP Cat 5e (4-pair)	328 feet (100 m)
UTP = Unshielded Twisted Pair			

► **Note:** The maximum cable length is the cable length that the signal can travel without suffering from attenuation (degradation).

### 1.1 Front Panel

Each module has three LEDs, a module power LED and two Link LEDs. Under normal operation the module PWR LED is green. Front panel indicators and controls are defined in [Table 2](#). A module is shown in [Figure 2](#).

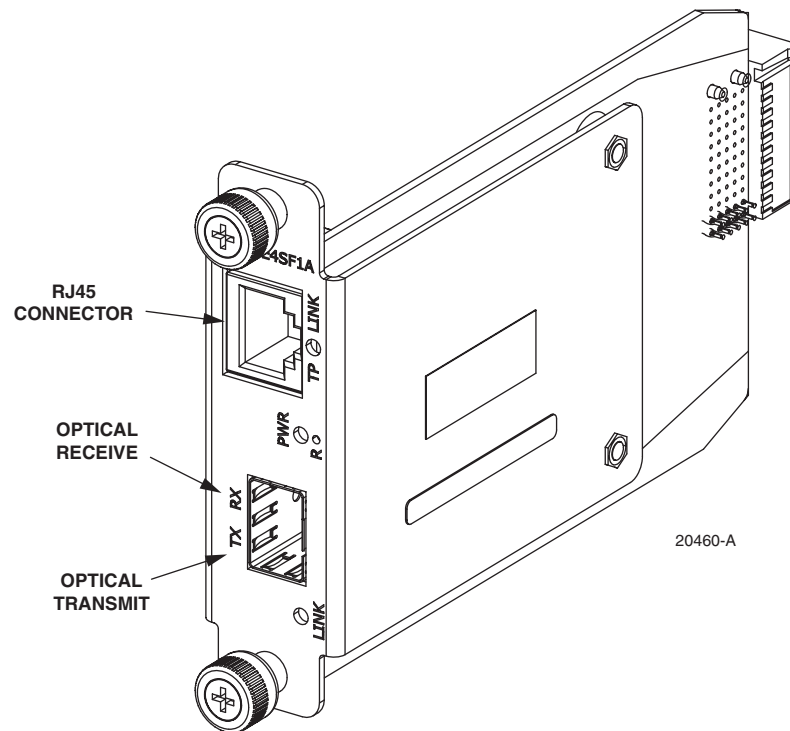


Figure 2. OptEnet Media Converter Converter

Table 2. Module LED Indicators

SIGNAL	COLOR	STATUS
TP Link	YELLOW	Auto negotiation complete, link status 10 Mb/s is OK.
	GREEN	Auto negotiation complete, link status 100 Mb/s or 1000 Mb/s is OK.
	OFF	Link status failed or no Ethernet detected.
Link	YELLOW	Auto negotiation complete, link status 10 Mb/s is OK.
	GREEN	Auto negotiation complete, link status 100 Mb/s or 1000 Mb/s is OK.
	OFF	Signal detect de-asserted, link status FAIL.
PWR	GREEN	Module Power OK
	OFF	Module Power OFF
<b>CONTROL</b>	<b>DESCRIPTION</b>	
Reset	If module supply voltage drops below a predetermined value the module shuts down, pressing the reset button restarts the module.	

Any blinking of a Link LED indicates auto-negotiation in process. If a Link LED continues to blink for more than 30 seconds then the operation of the far end device (i.e., duplex and speed) needs to be verified or changed.

## 2 UNPACKING AND INSPECTION



**Caution:** *Electronic modules can be damaged by electrostatic discharge (ESD). To prevent this, take the following precautions:*

- *Wear an anti-static-discharge wrist strap while handling modules.*
- *Place modules in anti-static packing material when transporting or storing them.*
- *Place modules on an approved, electrically grounded, anti-static mat when working on them.*

Unpack and inspect the module as follows:

1. Inspect the exterior of the shipping container(s) for evidence of rough handling that may have damaged the components in the container.
2. Unpack module, carefully checking it for damage and verify with the packing slip. If any item is damaged, consult ADC for repair, replacement, and warranty information. Even though no damage is evident, save the shipping container for use if the equipment requires shipment at a future date.
3. File a claim with the commercial carrier and notify ADC Customer Service if damage is detected or if parts are missing. Save damaged cartons for inspection by the carrier.
4. Refer to [Customer Information and Assistance](#) if you need to contact ADC.
5. Save all shipping containers for use if the equipment requires shipment at a future date.

## 3 INSTALLATION

### 3.1 1000 Mb/s Module

Each 1000 Mb/s module has a 2-position dip-switch for enabling or disabling the UTP (Unshielded Twisted Pair) Link upon detection of the fiber optic link. Position 1 enables or disables the UTP link independently of the fiber link. Position 2 reports the configuration to the CPU through the backplane interface. Position 1 and position 2 must be set to the same positions.

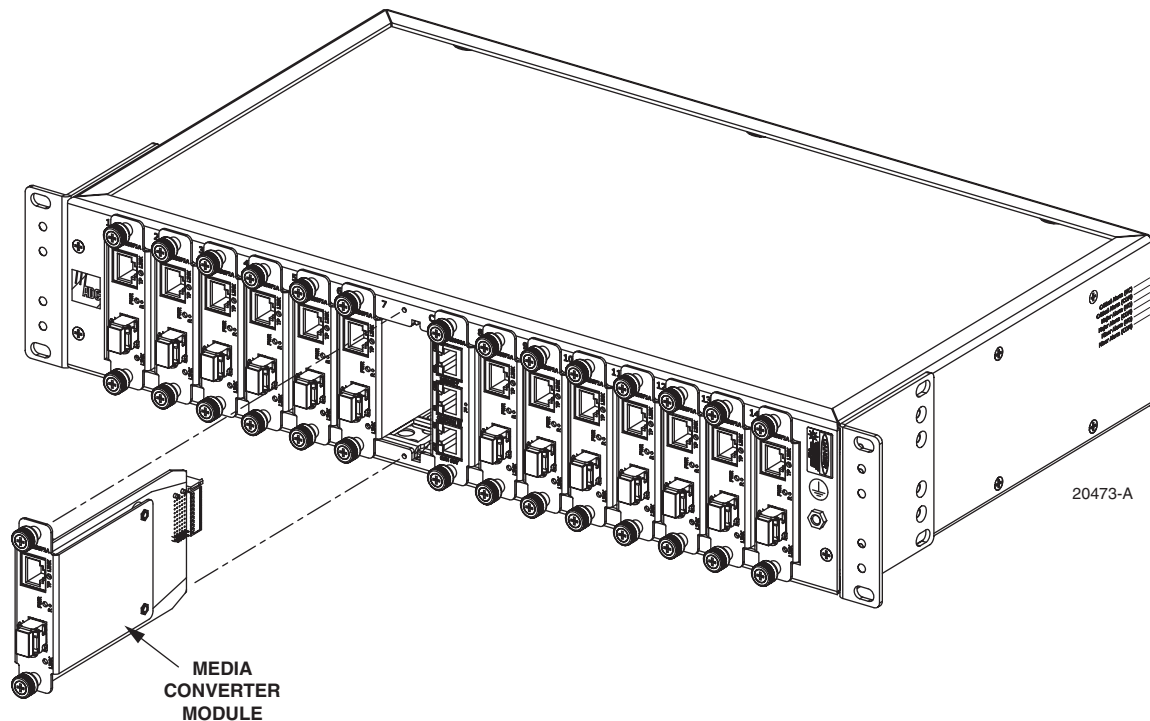
If DIP switches are set to the ON position, then the UTP side follows the fiber side. For example, if the fiber side links then the UTP side links also. If fiber side is not linked or loses link, then UTP side is not allowed to link or will drop the link. If switch is configured to the OFF position, then UTP link does not follow the fiber link. The UTP side links regardless of the status of the fiber side. [Table 3](#) shows the dip-switch positions.

**Table 3. 1000 Mb/s Dip-Switch Positions**

DIP SWITCH	DESCRIPTION
1	ON = UTP Link dependent of Fiber Link OFF = UTP Link independent of Fiber Link (Default position)
2	ON = Reports to CPU the UTP Link dependent of Fiber Link OFF = Reports to CPU the UTP Link independent of Fiber Link (Default position)

### 3.2 10/100 Mb/s Module

OptEnet Chassis should already be installed, power supplies installed, and power connections made before installing OptEnet Media Converter with SFP Modules. Media converter module can be safely removed and installed into a powered chassis. Module installation is shown in Figure 3.



**Figure 3. Installing Media Converter Module**

1. Locate the designated slot in the chassis for the module.



**Danger:** To avoid the possibility of severe and potentially fatal electric shock, never install electrical equipment in a wet location or during a lightning storm.



**Caution:** Electronic modules can be damaged by electrostatic discharge (ESD). To prevent this, take the following precautions:

- Wear an anti-static-discharge wrist strap while handling modules.
  - Place modules in anti-static packing material when transporting or storing them.
  - Place modules on an approved, electrically grounded, anti-static mat when working on them.
2. Slide OptEnet media converter into slot and plug it into the connector on the backplane. Modules can be plugged into any empty slot in the chassis. All fiber connectors are mounted in straight retainers. The module is held in place with thumbscrew fasteners.
  3. Secure the module in place by tightening the captive thumbscrews on each end. Be sure that they are properly threaded before tightening.
  4. If not already installed insert SFP into OptEnet media converter until you hear it click in place.

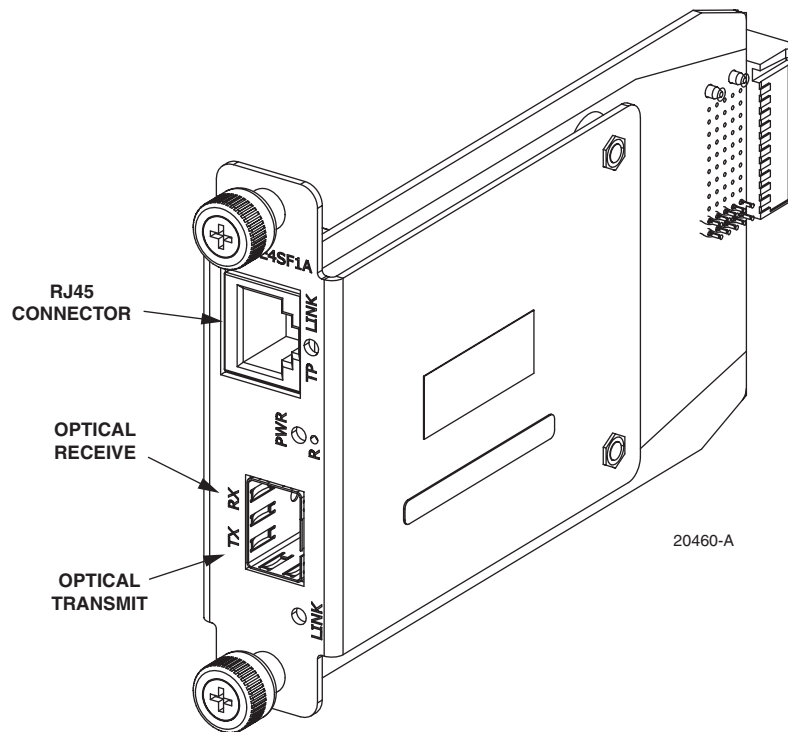


**Caution:** Always allow sufficient fiber length to permit routing without severe bends. Fibers may be permanently damaged if bent/curved to a radius of less than 1.5 in. (3.81 cm).



**Danger:** Infrared radiation is invisible and can seriously damage the retina of the eye. Do not look into the optical connector of an operational transmitter, or into the end of an active fiber. A clean, protective cap or hood **MUST** be immediately placed over any radiating connector or optical fiber to avoid exposure to potentially dangerous amounts of radiation. This practice also helps prevent contamination of connectors and adapters. Do not assume laser power is turned off or the fiber is disconnected at the other end.

5. Verify that the POWER LED is lit.
6. Remove the dust covers from fiber cable ends and from the media converter SFP.
7. Attach the fiber cable “TX” and “RX” connectors to the corresponding receptacles on the media converter. See [Figure 4](#).



**Figure 4. 10/100 Mb/s OptEnet Media Converter Module Connections**

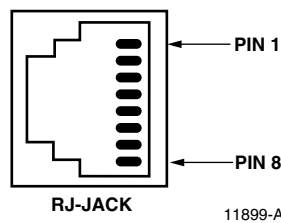


**Caution:** Ethernet signals over copper should not be used between buildings. Ground potential differences may cause transmission errors or line card failures.

8. Each media converter module has an RJ45 connector located on the front. Use this connector when making the copper Ethernet connection. RJ45 Patchcord pinout information is shown in [Table 4](#) or [Table 5](#) and [Figure 5](#).
  - a. Cat 5e or better RJ45 Patchcords are recommended.



- b. The IEEE Standard ANSI/TIA-568-B for Ethernet 10/100BaseT(X) requires that two twisted pairs be used and that one pair is connected to pins 1 and 2, and that the second pair is connected to pins 3 and 6.
  - c. The IEEE Specification Standard ANSI/TIA-568-B for Ethernet 1000BaseT requires that four twisted pairs are used. One pair is connected to pins 1 and 2, pair two is connected to pins 3 and 6, pair three is connected to pins 4 and 5, and pair four is connected to pins 7 and 8.
9. Connect Ethernet RJ45 patchcord to RJ45 receptacle on the converter module.
10. Verify that the front panel LEDs are active. Link LEDs are not lighted if there is no Ethernet or optical signal present.



**Figure 5. RJ45 Connector Wiring**

**Table 4. 10/100BaseT(X) Ethernet RJ45 Connector**

PIN #	SIGNAL NAME	FUNCTION	PIN #	SIGNAL NAME	FUNCTION
1	TX+	Transmit Data	2	TX–	Transmit Data
3	RX+	Receive Data	4	---	Not used
5	---	Not used	6	RX–	Receive Data
7	---	Not used	8	---	Not used

**Table 5. 1000BaseT Ethernet RJ45 Connector**

PIN #	SIGNAL NAME	FUNCTION	PIN #	SIGNAL NAME	FUNCTION
1	BD1+	Bidirectional	2	BD1–	Bidirectional
3	BD2+	Bidirectional	4	BD3+	Bidirectional
5	BD3–	Bidirectional	6	BD2–	Bidirectional
7	BD4+	Bidirectional	8	BD4–	Bidirectional

## 4 SPECIFICATIONS

Table 6 and Table 7 lists the specifications for the module.

**Table 6. Electrical and Mechanical Specifications**

PARAMETER	SPECIFICATION	REMARKS
<b>Electrical</b>		
Input Voltage	+5 VDC	Backplane connector
Input power (10/100 Mb/s)	1.75 W max.	Normal operation
Input power (1000 Mb/s)	2.2 W max.	Normal operation
<b>Mechanical</b>		
Chassis Compatibility	OptEnet Media Converter	All modular systems
Module Retention	Captive thumbscrews	
Dimensions (H×W×D)	1.14 in.× 8.07 in.× 7.4 in. (2.89 cm × 20.5 cm × 18.8 cm)	
Weight	0.27 lb. (122 g.)	
<b>Electrical Signal Interface</b>		
RJ45	Two twisted pair	10/100 Mb/s
RJ45	Four twisted pair	1000 Mb/s
<b>Optical Signal Interface</b>		
LC	Singlemode 1410 – 1610 nm *	
* - Refer to the <i>OptEnet SFP Transceiver Specifications</i> listed in <a href="#">Related Publications</a> , for optical specifications.		

**Table 7. Module Environmental Specifications**

PARAMETER	SPECIFICATION	REMARKS
Operating Conditions	41°F to +104°F (5°C to +40°C)	Per Telcordia GR-63
Short Term Conditions	+23°F to +122°F (−5°C to +50°C)	Per Telcordia GR-63
Storage Conditions	−40°F to +185°F (−40°C to +85°C) at 5% to 95% RH	Non-condensing

## 5 POWER-UP/CHECK OUT PROCEDURE

Media Converter Modules are powered up as soon as power is applied to the chassis. The POWER indicator (GREEN LED) on the converter module should light to indicate that VDC power is applied to the media converter. If POWER indicator does not come on, verify that power connections between the Media Converter Module and the power supply are secure. Verify that there is power present at the source. If this procedure does not resolve the problem, replace the cable or power supply.

OptEnet Media Converter with SFP modules support Medium Dependent Interface Crossover (MDI-X). OptEnet Media Converter Module Ethernet ports allow connections to other hubs or switches without a null-modem or crossover cable. If a null-modem or crossover cable has been used the OptEnet Media Converter with SFP module automatically detects this and switches the contacts to match the other end.

Any blinking of a link LED indicates auto-negotiation in process. If a link LED continues to blink for more than 30 seconds then the operation of the far end device (i.e., duplex and speed) needs to be verified or changed.

## 5.1 10/100 Mb/s Module

If the PC workstation port has been set to auto-select (i.e., full auto-negotiation) for speed and duplex, the TPLink LED will be OFF when power is applied unless a valid optical link has already been established with a remote optical port. If a valid optical link has been established, FOLink LED will be YELLOW for 10 Mb/s operation or GREEN for 100 Mb/s operation. The preferred mode of operation for the port is auto select for both speed and duplex. This will insure that a link can be established regardless of the far end operational mode.

OptEnet 10/100BaseLX Media Converters support auto-negotiation as defined in TIA/EIA-785. Auto-negotiation allows the unit to automatically select the highest performance level for COPPER or FIBER.

## 5.2 1000 Mb/s Module

Set data rate speed to 1000 Mb/s and enable half/full duplex auto-negotiate on any equipment connected to the OptEnet 1000 Mb/s Media Converter module.

If the Network Interface Card (NIC) or port in the PC workstation has been set to 1000 Mb/s for speed and half/full duplex auto-negotiate, the link LED will be OFF when power is applied. Once valid optical and electrical links have been established, link LEDs turn GREEN.

# 6 OPERATION

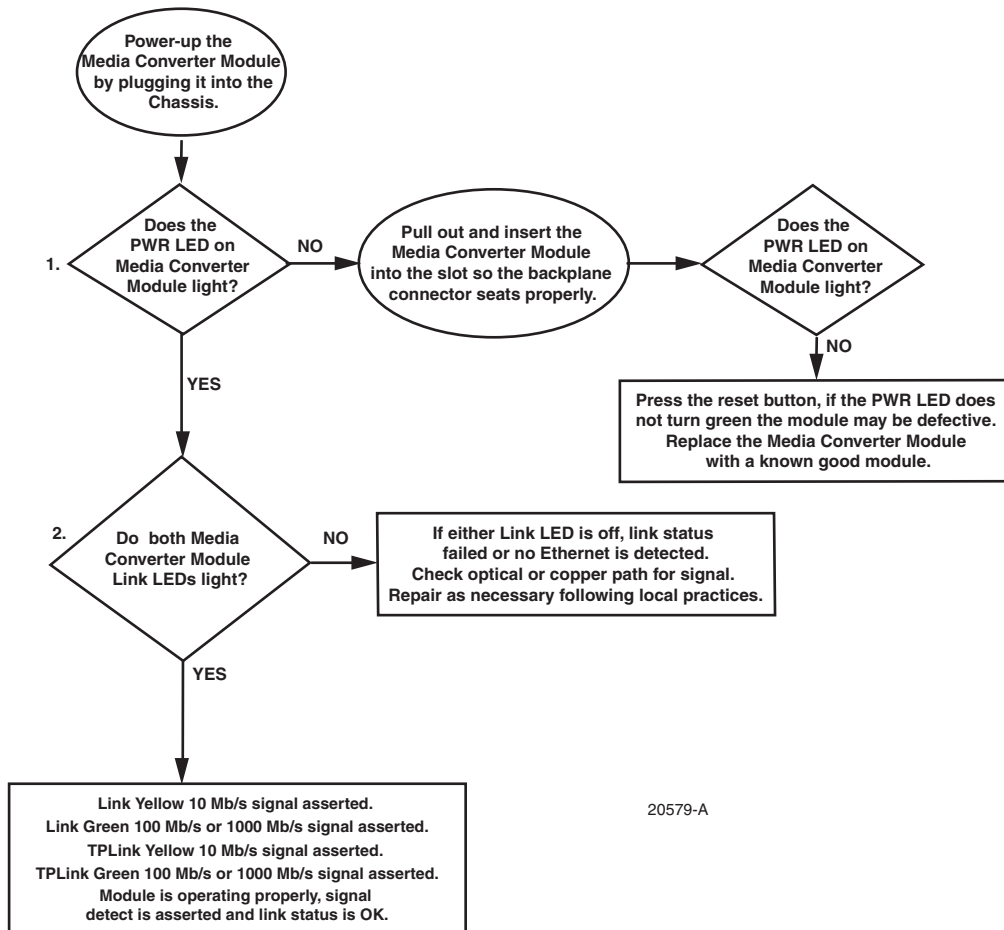
The Module may be controlled through a Command Line Interface. Refer to the *OptEnet Media Converter Communications User Manual* listed in [Related Publications](#), for operational procedures that pertain to the CPU module.

# 7 MAINTENANCE

Follow standard cleaning practices for maintenance of fiber adapters and connectors.

## 8 TROUBLESHOOTING

This section provides a troubleshooting flowchart, and corrective actions for the Module.



## 9 CUSTOMER INFORMATION AND ASSISTANCE

### PHONE:

#### EUROPE

Sales Administration: +32-2-712-65 00

Technical Assistance: +32-2-712-65 42

#### EUROPEAN TOLL FREE NUMBERS

Germany: 0180 2232923

UK: 0800 960236

Spain: 900 983291

France: 0800 914032

Italy: 0800 782374

#### U.S.A. OR CANADA

Sales: 1-800-366-3891 Extension 73000

Technical Assistance: 1-800-366-3891

└ Connectivity Extension 73475

└ Wireless Extension 73476

#### ASIA/PACIFIC

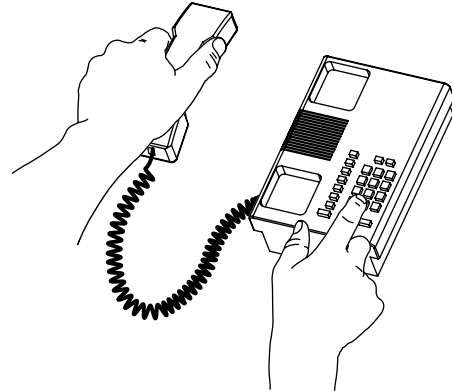
Sales Administration: +65-6294-9948

Technical Assistance: +65-6393-0739

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Technical Assistance: +1-952-917-3475

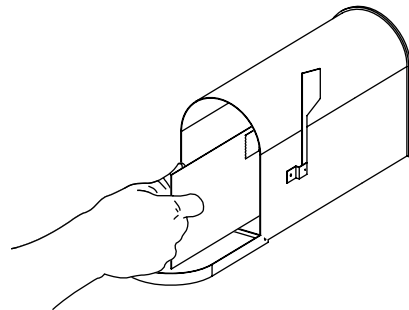


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SINGAPORE 189702.

ADC EUROPEAN CUSTOMER SERVICE, INC  
BELGICASTRAAT 2,  
1930 ZAVENTEM, BELGIUM



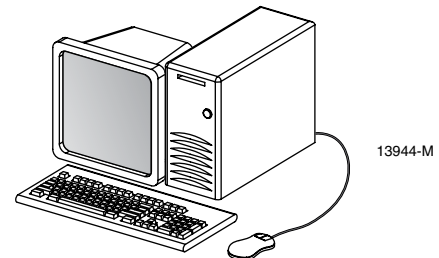
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